

BROWN (F. T.)

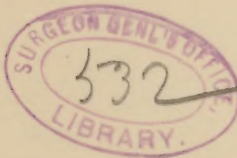
A Case of Cystitis, Pyelonephritis, and
Pyonephrosis due to Colon-
Bacillus Infection.

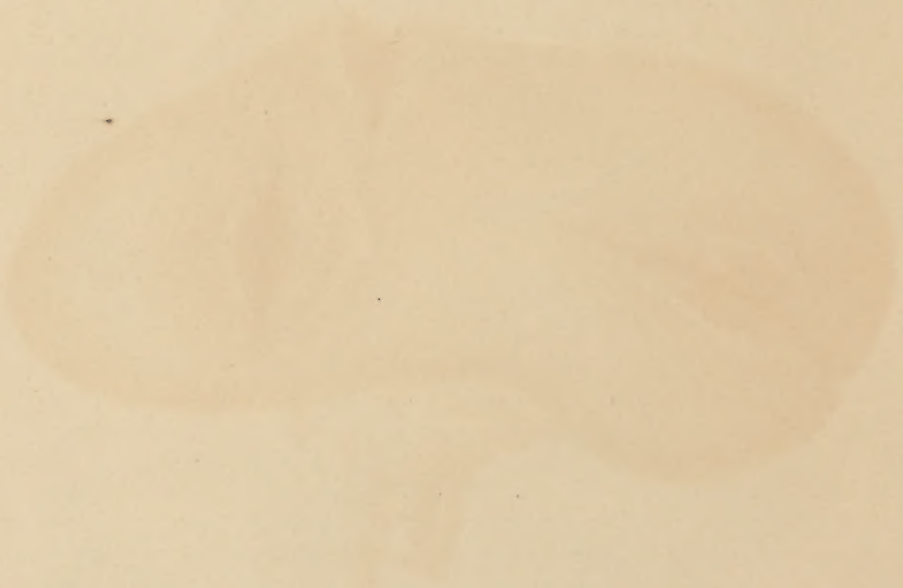
*Presentation of Two Kidneys showing different
Stages of Infective Disease. The Bacillus
Coli Communis only being found. Pres-
entation of One Kidney in the
Early Stage of Cortical
Tuberculosis.*

BY

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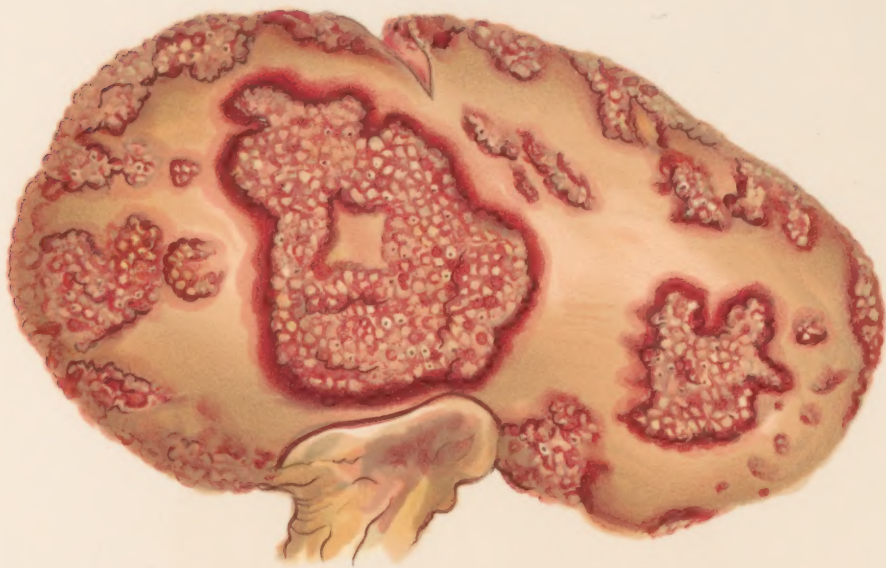


Fig. 1.—Septic Kidney of Undetermined Age.

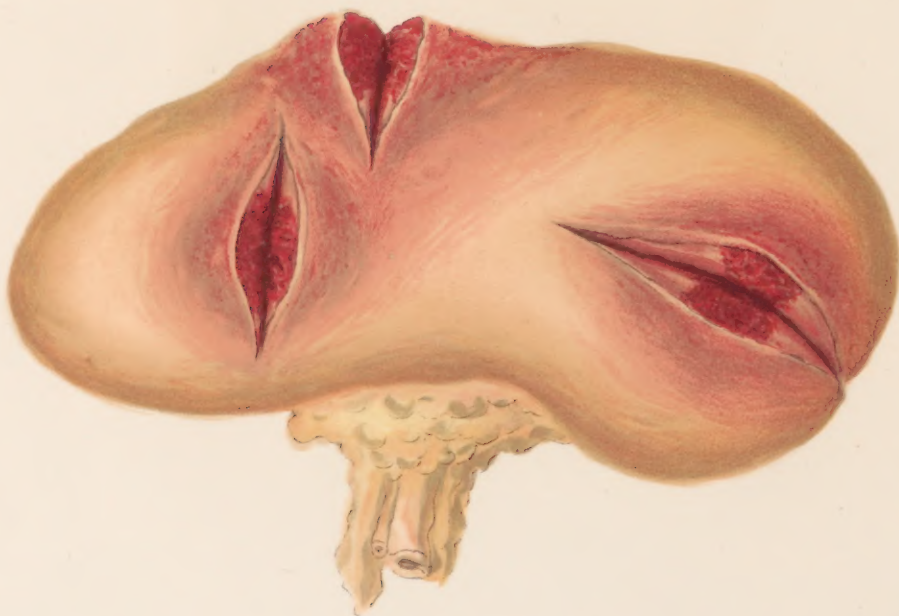


Fig. 2.—Early Stage Septic Kidney.

ILLUSTRATING DR. BROWN'S ARTICLE ON SEPTIC
AND TUBERCULOUS KIDNEYS.



Fig. 3.—Tuberculous Kidney.

ILLUSTRATING DR. BROWN'S ARTICLE ON SEPTIC
AND TUBERCULOUS KIDNEYS.



A CASE OF CYSTITIS, PYELONEPHRITIS, AND PYONEPHROSIS
DUE TO COLON-BACILLUS INFECTION.

PRESENTATION OF TWO KIDNEYS SHOWING DIFFERENT
STAGES OF INFECTIVE DISEASE. THE BACILLUS
COLI COMMUNIS ONLY BEING FOUND. PRESEN-
TATION OF ONE KIDNEY IN THE EARLY
STAGE OF CORTICAL TUBERCULOSIS.*

By F. TILDEN BROWN, M. D.

MR. PRESIDENT AND GENTLEMEN: The title of this first case is purposely made assertive, with a distinctly stated ætiology, more with the intent to elicit discussion upon the importance or non-importance of the *Bacillus coli communis* as a pathogenic agent in urinary diseases, than because this particular example affords any unusual opportunities for positive deductions.

By the courtesy of Dr. McCosh I studied and now report this case, which came to his service in the Presbyterian Hospital, where he performed a successful nephrectomy. It is due to the operator to state here that he is not ready to accept the views of Albarran, Krögius, Rovsing, Hallé, and others regarding the pathogenic properties in general of the colon bacillus, and responsibility for the title of the paper is assumed by myself, mainly for the purposes already stated.

The patient, S. W. A., male, forty years old, United States, widower, masseur. No rheumatic, tubercular, gonorrhœal, or syphilitic history. Fifteen years ago he had malarial fever; ten years ago, bronchopneumonia, due, he was told, to his occupation as file-grinder. He then became a railroad hand, and had good health until three years

* Read before the American Association of Genito-Urinary Surgeons, 1894.

later—1886—when he sustained a rather severe contusion of his left side by some freight falling upon him. It is probable that the left kidney was a little injured at this time, as some slight functional disturbance of urination followed it; but as the sexual functions were noted at the same time to be affected, the lumbar cord only may have suffered a lesion, or a kidney and cord injury may have occurred together. At the time of the accident the patient had been a widower for one year; during this time he had had promiscuous intercourses four or five times in a satisfactory manner. One week after the accident, during coitus, he experienced at the moment of ejaculation severe pain, which was characterized by suddenness, and by a sensation suggesting the passage through the urethra of some large, hard body. Coitus attempted four days later, although unaccompanied by pain, was attended by emission before intromission. Since then this latter condition has been permanent.

He sought professional aid immediately upon discovering this sexual weakness. Treatment by sounds for four months was uneventful, until finally a sound larger than any passed before caused some pain; ten minutes later he was compelled to urinate, and he noticed blood in the urine. Pain and frequency continuing, he a few days later entered a hospital and was there successfully treated for cystitis.

When discharged cured he called upon his former attendant, and reluctantly submitted to the introduction of a sound. The following day he returned to the hospital with an attack of cystitis more severe and protracted than the first. Within a few days he noted pain in the region of the left ureter and then higher up on the left side. He was confined to bed for three weeks.

Upon leaving the hospital in 1888 symptoms of cystitis had been replaced by those of pyelitis or pyelonephritis. In this condition he continued for three years, when, being obliged to do heavy lifting as a nurse, the discomfort in the left side increased and the quantity of pus in his urine became greater. It was at this time he first noticed an enlargement of his left kidney.

He had been accustomed to irrigate the bladder with boric-acid solution, but in September, 1893, he experimented with a weak solution of hydrogen peroxide as a vesical lavage. Almost at once the catheter was forcibly expelled, the injection accompanying it with sputtering of gas. He very soon had a chill, followed by fever, nausea, and vomiting. This was the introduction to a rather prolonged and quite painful attack of pyonephrosis, during which the kidney attained a considerable size before the yielding of the obstruction, which liberated much pus-laden urine and afforded temporary relief. In the next four

months he had three similar attacks. From the last he was just recovering when he entered the Presbyterian Hospital on January 23, 1894.

On admission, temperature, 98.2°; pulse, 84; respiration, 20.

Physical Examination.—Heart, lungs, liver, spleen, negative; extremities, negative; prostate, seminal vesicles, and epididymes, negative.

Abdomen.—On left side, on deep palpation, some pain and resistance, and well up under the free ribs an indurated mass can be felt. Urine, turbid, acid; specific gravity, 1.020; contains much pus and very little blood; albumin in proportion to the blood and pus present. On January 27th the urine was drawn by a sterilized catheter. Cultures from this on different media gave a pure growth of *Bacillus coli communis*. For one month the patient was kept under observation. During the last week of this time pain in the left side had become constant, abdominal tension had increased, and a tumor in the left kidney region was now felt.

February 20, 1894.—Operation, extraperitoneal. The left ilio-costal space is well exposed by body flexure and bags under the right side. A four-and-a-half-inch incision, commencing along the outer border of the erector spinæ muscle and curving forward, divides the serratus magnus, lumbar fascia, and quadratus lumborum, exposing the perirenal fat. On separating this, a dark tissue of thin texture and made up of rounded folds appears. At first it resembled discolored colon; fuller exposure showed it to be kidney, represented by a thin-walled sacculated mass of treble the normal size.

To permit a nephrectomy the wound was enlarged anteriorly. The lower half of the organ, which had been separated from firm adhesions, the ureter, ligated and cut, now filled the wound. Evacuation of its pyuric contents made it possible to reach for the upper half of the kidney and the pedicle. At this moment, upon slight traction, the wound quickly filled with blood, and an alarming hæmorrhage of arterial blood was apparent. With long clamps through the well of blood the operator made repeated and finally successful efforts to secure the vessels; the remaining adhesions were quickly severed and the kidney removed. The four clamps were left in place, packed around by gauze, and the dressing applied. The pulse, which had been strong before, was now not perceptible at the wrist. For the ensuing twelve hours the patient's condition was critical, and for the three following days all the prominent symptoms of severe hæmorrhage were present. Forty-eight hours after the operation the dressing was removed, the clamps quietly unlocked, and, as no bleeding occurred, they were removed. A sponge rather firmly fixed at the bottom of the wound it was thought best to leave.

Plantings made from the kidney immediately upon removal yielded a pure growth of the *Bacillus coli communis*.

Again, on April 2d, five weeks after operation, the urine, drawn by a sterilized catheter, gave the same growth. Again, on May 23d, three months after operation, the same test gave the same growth.

At this time the patient was apparently perfectly well. He was twenty pounds heavier than he had been at any time during the past three years. The daily excretion of urine varied between forty-five and fifty ounces. It was quite clear on gross inspection, acid, and passed at normal intervals.

In this case it is not irrational to think that the patient had a not very active bronchial or pulmonary tuberculosis when he was told that he must change his occupation because of a broncho-pneumonia; that, from this source, a local renal tuberculosis followed his back injury; and that by urethral trauma and cystitis the kidney lesion subsequently became a suitable nidus for an ascending infection by the colon bacillus, resulting in pyonephrosis. But all evidence of tuberculosis, so far as the examination was carried while the patient was in the hospital, failed to disclose it.

Two other cases have recently come under my observation where, when the kidney was removed, the only lesions seen by gross and microscopic examination were those of a septic nature, and the only contagium found by cultures speared from the organs after disinfection of the surface by cautery was the *Bacillus coli communis*—so adjudged to be by its morphological and non-motile appearance, by its somewhat characteristic growth on different media, by its production of gas, and by its coagulation of milk.

For these and all the bacteriological examinations connected with the cases presented in this paper I am indebted to Dr. G. A. Tuttle, assistant pathologist to the Presbyterian Hospital.

For the specimen and history of the following case I have again to thank Dr. McCosh. The kidney specimen in the succeeding case is from a patient referred to me by Drs. Walker and Swift, and upon whom Dr. McBurney performed the nephrectomy.

FIRST OF THE TWO SPECIMENS SHOWING INFECTIVE DISEASE OF UNCERTAIN DURATION * (FIG. 1, colored plate).

Mrs. F., twenty-five years; Ireland; in United States six years. Married three months. No tubercular, rheumatic, syphilitic, or gon-

* The specimen shown at the time this paper was read.

orrhœal history. No history of strain or traumatism. For three years she has had pain in the left side of varying severity, with no distinct recollection of how it began. At times these attacks of pain have been quite severe and attended with nausea and vomiting, and urination was then rather frequent, averaging every two hours. Blood in the urine was never noticed. During the last two years the patient has lost twenty pounds. She is now two months pregnant.

On May 11, 1894, the patient went to bed apparently well. She awoke during the night with very severe pain in the region of the left kidney. Obstinate vomiting began and persisted for forty-eight hours, when she was admitted to the medical service of the Presbyterian Hospital with a temperature of 102.5° , pulse 105, respiration 20. A painful and apparently enlarged left kidney was felt. The following day she was transferred to the surgical division, where extraperitoneal nephrectomy was performed by Dr. McCosh on May 14th, yielding this moderately hypertrophied kidney (Fig. 1, colored plate). The capsule, which is now removed, was only a moderate cloak to the lesions. These are seen to be confluent and discrete, the former being irregularly circular, the largest patches being the size of a dollar. The smallest discrete lesions are of pinhead size. All are distinctly raised; the patches are quite uniform but undulating plateaux. A narrow inflammatory zone surrounds all lesions, which everywhere exist in different stages of development, as papules, pustules, or raised ulcers. Few depressed cicatrices are to be seen.

Although the surface and superficial parts of the cortex evidence the gross lesions, cultures from the deeper portions of the kidney gave the same growth, namely, *Bacillus coli communis*.

Immediately after the operation the patient's temperature became nearly normal, and was not afterward above 99° F. Pains, nausea, and vomiting ceased, and urination assumed normal intervals. A week later abortion was produced as a precautionary measure to the other kidney. One month after the operation a bacteriological examination of the acid urine drawn by a sterilized catheter gave by culture a pure growth of colon bacillus.

Eight weeks after the operation the patient left the hospital well. Six months later* the patient had gained in weight, and had no urinary symptoms. A bacteriological examination of the urine drawn by a sterilized catheter gave still a pure culture of the colon bacillus.

It is difficult to formulate a satisfactory analysis of this case. There was no discoverable lesion of the kidney or pelvis to account

* Examination and note made since reading this paper.

for the attacks of pain and vomiting which had at times occurred during three years. That the organ may have been a movable one we can think of, but there was no evidence to that effect at the operation. In fact, it was then particularly firm in its position. That the septic processes found could have existed for so long a time it is possible but hard to believe. From the superficial position of the gross lesions on the surface of the cortex we would infer that the contagion had reached the organ by the blood-channels rather than by urethral ascent from the bladder. And in this connection I think future study will show that the hæmatogenous route for renal infection by the *Bacillus coli communis* is more common than at present it is believed to be.

SECOND OF THE TWO SPECIMENS* SHOWING A VERY EARLY STAGE OF SEPTIC KIDNEY (FIG. 2, colored plate).

D. G., United States, thirty-five years, single. Father was of gouty habit, and died of some renal complication. No tubercular, rheumatic, syphilitic, or gonorrhœal history. No history of strain or traumatism. Was very active, but always considered delicate.

In May, 1893, patient had *grippe*. Was referred to me in August, 1893, with marked symptoms of cystitis, which yielded to treatment in three days and left unmistakable evidence of pyelitis, no cause for which could be arrived at by persistent study. In January, 1893, the pus-laden acid urine drawn by sterilized catheter afforded no growths on various media, and guinea-pig inoculation was negative. Calculous and tuberculous pyelitis were sought to be proved to exist, but in vain. Left-sided pyelitis was diagnosed by the cystoscope, the pus issuing from the left ureter giving the distinct effect of cloudy swirls. In February, 1893, perineal cystotomy and tube drainage were instituted for the relief of frequent urination and tenesmus; the bladder was greatly relieved, but, with the exception of polyuria, which now disappeared, the conditions pertaining to the kidney—pyuria—remained the same.

Late in April, 1893, perineal drainage still being maintained, symptoms of sepsis appeared; temperature about or above 102.5° ; constant nausea, occasional vomiting, frequent sweats. Although neither kidney gave any symptoms on palpation, the previous observations showed certainly some disease of the left pelvis, and in the present crisis an operation directed toward that organ seemed to be called for. Nine days after the appearance of septicæmia, nephrectomy was performed by Dr. McBurney. After separation of the fatty envelope firm re-

* Specimen shown at time this paper was read.

sisting lesions could be felt through the capsule. The kidney (Fig. 2, colored plate, now shown with the capsule unremoved), presents appearances which promise to eventuate as those seen in the first specimen, where the inflammatory zone about all the lesions is broader and much more vivid on the surface; the incision, however, exposes an acute process within the cortex. Cultures made from the surface and deeper portions gave pure growths of the *Bacillus coli communis*.

Nothing was found, by gross or microscopic examination, in the pelvis or calyces to explain the long pre-existing sterile pyelitis. The acid urine immediately after the operation became free from pus and albumin. The perineal tube was removed, and the urinary intervals soon became normal.

One month later bacteriological study of the acid urine drawn by sterilized catheter showed a pure growth of the colon bacillus. Eight months after the operation, and when the patient was in better health than he had had for years, and ten pounds heavier, a similar bacteriological test of the acid urine gave the same result—pure growth of the *Bacillus coli communis*.

Besides the outline here given, the details in this case are of sufficient interest to make them the subject of a paper now preparing by the operator and myself.

The only two points now requiring notice are: first, that before the onset of sepsis bacteriological study of the acid pus-laden urine proved it to be sterile. But after sepsis had been diagnosed by clinical symptoms, bacteriological examination of the removed kidney and all subsequent examinations of the non-purulent acid urine showed a pure culture of the colon bacillus.

Secondly, the demonstration by this case of the value of the cystoscope, and that of experimental bacteriology, with production of artificial cystitis and pyonephrosis by the *Bacillus coli communis*, where a pre-existing lesion or a contemporaneously inflicted trauma had been shown to be one of the essential factors. It was by the cystoscopic recognition of a pre-existing left-side pyelitis which gave us reason to believe that only the left kidney was in a receptive state for an ascending infection, and that its removal was indicated if any operative interference was to be offered. The fact that in this specimen, as well as in No. 1, the gross septic lesions were mainly on the surface, would suggest an arterial deposition of the contagium rather than a ureteral ascension. But if this was the case, the organ may have been less competent than a sound one to resist an attack directed against it by circulating micro-organisms as well as by way of direct ascending continuity.

To review briefly these three cases, we see in all, first, clinical evidence pointing to a diseased state of one kidney, which, upon removal, shows septic lesions, with no other ascertainable cause than the presence of *Bacillus coli communis*.

Secondly, we note in all not only a recovery from the renal and urinary symptoms, but a condition of better general health and weight than the patient had had for a long time previous to the operation. Thirdly, we note long after recovery the persistence of the bacilli in the urine.

If from these facts we can not absolutely conclude, we may at least infer that the *Bacillus coli communis* under certain circumstances becomes a pathogenic agent when it gains access to the kidney either by the blood or by the ureter. At the same time we may infer that this bacillus can continue to live in the urinary tract without exciting symptoms or interfering in any manner with a condition of apparent health, unless a subsequent trauma be sustained by the mucous membrane of this tract.

Because, during operations, as well as at autopsy, the lesions pertaining to renal sepsis are not infrequently mistaken for those of tuberculosis, the following typical specimen is shown in conjunction with the two preceding.

PRESENTATION OF A KIDNEY IN THE EARLY STAGES OF CORTICAL
TUBERCULOSIS * (Fig. 3, colored plate).

For this specimen and history I am indebted to Dr. Kelly and Dr. O'Neill, of the Colored Hospital, New York.

J. H., aged thirty-two, male, colored, laborer; admitted to Colored Hospital, New York, September 6, 1894. Parents living; nine brothers and sisters all living and in good health. Never had variola, typhoid or intermittent fever, gonorrhœa, or syphilis. One slight attack of acute rheumatism.

Five months ago he began to suffer with a cough and dyspnoea; he steadily lost weight and strength. On admission, temperature, 100.2°; respiration, 25; pulse, 88. Urine, specific gravity, 1.010, acid, light-colored; no albumin or sugar. Heart, liver, spleen, and extremities negative. Retraction above and below both clavicles. Dullness on percussion at both apices. Pleuritic friction sounds. Very little cough. Dull and stupid, tongue slightly coated, but appetite good and bowels regular. Diagnosis, phthisis pulmonalis. Died September 9, 1894. Autopsy: (Head not opened.) General miliary tuberculosis existed in

* Specimen not shown at the time this paper was read.

both lungs, liver, spleen, both kidneys (see colored plate), in the prostate, and four or five tubercles were seen near the base of the bladder; testes and epididymes and vesicles not examined. None of the organs show broken-down cavity lesions.

Microscopic sections of the kidney tubercles show giant and epithelioid cells and tubercle bacilli.

Fig. 3 (colored plate) shows characteristic small tubercular nodules now somewhat past their initial stage of miliary granulations. In this case the tubercle bacilli have been distributed to the cortex of the organ by the renal artery. The circulation in the arterioles of the glomeruli and those of the cortical surface is the most retarded, and from these vascular points the bacilli may best gain the surrounding connective and cellular tissue. In this specimen the apical portions of the pyramids, the calyces, and the renal pelvis showed no lesions, which they must necessarily have done had the disease been of the ascending urinary variety.

The differentiation between infective processes of *Bacillus coli communis* (Figs. 1 and 2, colored plate) and those of *Bacillus tuberculosis* (Fig. 3, colored plate) is strikingly shown by the inflammatory conditions pertaining to the former and by their absence in the latter. Marked hyperæmia not only surrounds the foci, but many of the individual lesions have suffered peripheral ulcerations; whereas the tubercular lesions are characterized by absence of this surrounding hyperæmia, and whatever of ulceration or necrosis occurs in the individual lesions is a central, not peripheral, manifestation.

The distinction in the cases here shown is apparently easy; but when tuberculosis is implanted upon pre-existing inflammatory renal changes, and again when this order is reversed—that is, where in either case a mixed infection presents—it may be difficult, if not impossible, by gross inspection to say that tuberculosis does or does not exist.

In the early stages kidneys attacked by an ascending infection of *Bacillus coli communis* microscopically show degeneration of the renal epithelium and small pus collections between the tubules. With a higher power the colon bacilli are seen in the tubules, in the pus collections, as well as in isolated clusters where they have undergone considerable proliferation before any tissue changes have been instituted. At times a favorable section will permit the tracing of this invasion from the apex of a pyramid to a lesion on the cortical surface.

Schmidt and Aschoff call attention to the celerity of this ascent of the uriniferous tubules, where the different pathological stages develop in from thirty-six hours to one week, but we must remember that their

observations concerned artificial pyonephrosis where ligation of the ureter was done in conjunction with the injection of the bacilli.

The more or less general small-cell infiltration of the tissues in the surrounding regions of small tubercular processes and those due to the colon-bacillus infection are not unlike.

40 East Thirty-first Street.

